

WHAT IS CLAIMED IS:

1. A directional microphone, comprising:

a housing;

5 a diaphragm dividing said housing into a front volume and a back volume;
electronics for detecting signals corresponding to movements of said
diaphragm;

a front inlet to said front volume;

a back inlet to said back volume; and

10 an elongated acoustical conduit connecting said front volume and said back
volume.

2. The directional microphone of claim 1, said directional microphone having a 6
dB/octave low frequency roll-off, wherein said acoustical conduit is configured to
15 have an acoustical inertance to provide an additional 6 dB/octave low frequency roll-
off.

3. The directional microphone of claim 1, wherein said acoustical conduit is
positioned within said diaphragm.

20 4. The directional microphone of claim 1, wherein said diaphragm has a support
structure holding said diaphragm in said housing, said acoustical conduit being
positioned within said support structure.

25 5. The directional microphone of claim 1, wherein said acoustical conduit has
acoustical characteristics that are predominantly inductive, rather than resistive.

6. The directional microphone of claim 1, wherein said front and back inlets
include inlet tubes.

30 7. The directional microphone of claim 6, wherein said inlet tubes include a
screen structure.

8. The directional microphone of claim 1, wherein said acoustical conduit has a length of from about 1 mm to about 6 mm.

9. The directional microphone of claim 1, wherein said acoustical conduit is positioned external to said housing.

10. The directional microphone of claim 1, wherein said acoustical conduit has a diameter of from about 0.05 mm to about 0.5 mm.

11. The directional microphone of claim 1, wherein said directional microphone has a frequency response curve with a 12 dB/octave roll-off at frequencies below about 2.0 kHz.

12. The directional microphone of claim 1, wherein said acoustical conduit presents an acoustical inductance of at least 100 mH as represented by the electrical analogy.

13. The directional microphone of claim 1, wherein said acoustical conduit is a cylindrical tube.

14. The directional microphone of claim 13, wherein said cylindrical tube is integrally formed within walls of said housing.

15. A directional microphone, comprising:

a moveable structure producing signals responsive to sound energy and dividing a front volume from a back volume, said front volume and said back volume being exposed to the environment for receiving said sound energy; and

a wind noise suppression conduit acoustically connecting said front volume and said back volume.

16. The directional microphone of claim 15, wherein said wind noise suppression conduit is located external to a housing in which said moveable structure is disposed.

17. The directional microphone of claim 15, wherein said wind noise suppression conduit is located within a housing in which said moveable structure is disposed.

18. The directional microphone of claim 15, wherein said wind noise suppression
5 conduit is formed by a housing in which said moveable structure is disposed and a mounting plate positioned against said housing.

19. The directional microphone of claim 15, wherein said directional microphone
10 has a frequency response curve with a 12 dB/octave low frequency roll-off at frequencies below about 2.0 kHz.

20. The directional microphone of claim 15, wherein said directional microphone
15 has a frequency response curve with a 12 dB/octave low frequency roll-off at frequencies below about 500 Hz.

21. The directional microphone of claim 15, wherein said wind noise suppression
conduit has a length of from about 1 mm to about 6 mm.

22. The directional microphone of claim 21, wherein said wind noise suppression
20 conduit has a diameter of from about 0.05 mm to about 0.5 mm.

23. The directional microphone of claim 15, wherein said wind noise suppression
conduit has a diameter of from about 0.05 mm to about 0.5 mm.

24. The directional microphone of claim 15, wherein said wind noise suppression
25 conduit is formed by a housing of said directional microphone and a mounting plate positioned against said housing and connects sound inlets leading to said front and back volumes.

25. The directional microphone of claim 15, wherein said wind noise suppression
30 conduit is located external to a housing of said directional microphone and connects sound inlets leading to said front and back volumes.

26. The directional microphone of claim 25, wherein said wind noise suppression conduit has a circular internal opening.

27. The directional microphone of claim 25, wherein said wind noise suppression
5 conduit has a rectangular internal opening.

28. The directional microphone of claim 25, wherein said wind noise suppression conduit is formed at least in part by walls of said housing.

10 29. The directional microphone of claim 28, wherein said wind noise suppression conduit is formed entirely by said walls of said housing.

30. The directional microphone of claim 15, wherein said wind noise suppression conduit is located internal to a housing of said directional microphone and extends
15 between said front and back volumes.

31. The directional microphone of claim 30, wherein said wind noise suppression conduit is integrally formed within the walls of said housing of said directional microphone.

20 32. The directional microphone of claim 30, wherein said wind noise suppression conduit is a tubular structure that extends through a support frame supporting said moveable structure.

25 33. The directional microphone of claim 15, wherein said wind noise suppression conduit presents an acoustical inductance of at least 100 mH as represented by the electrical analogy.

30 34. The directional microphone of claim 15, further including a second wind noise suppression conduit acoustically connecting said front volume and said back volume.

35. The directional microphone of claim 34, wherein one of said second wind noise suppression conduits is internal to a housing of said directional microphone and another is external to a housing of said directional microphone.

36. A method of suppressing wind noise in a directional microphone having a front and back volume, comprising:

5 acoustically connecting said front volume and said back volume with an elongated conduit having an acoustical inertance.

37. The method of claim 36, wherein said connecting occurs between a front inlet tube leading into said front volume and a back inlet tube leading into said back volume.

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38. The method of claim 37, wherein said front inlet tube and said back inlet tube includes a screen structure, said elongated conduit being connected to said front and back inlet tubes downstream of said screen structures.

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39. The method of claim 36, wherein said connecting occurs internally within said microphone across a diaphragm dividing said front volume and said back volume.

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40. The method of claim 36, wherein said acoustical inertance provides an additional 6 dB/octave low frequency roll-off in addition to the 6 dB/octave low frequency roll-off in said directional microphone.

41. The method of claim 36, wherein said elongated conduit has a length of from about 1 mm to about 6 mm.

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42. The method of claim 36, wherein said elongated conduit has a diameter of from about 0.05 mm to about 0.5 mm.

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43. The method of claim 36, wherein said acoustical inertance provides said directional microphone with a frequency response curve with a 12 dB/octave low frequency roll-off at frequencies below about 2.0 kHz.

44. The method of claim 36, wherein said acoustical inertance presents an acoustical inductance of at least 100 mH as represented by the electrical analogy.

45. A method of preventing a low frequency overload due to wind noise in a directional microphone having a front volume and a back volume separated by a diaphragm, comprising:

adding an acoustical inductive element in parallel with said diaphragm.

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46. The method of claim 45, wherein said adding includes connecting said front volume and said back volume with an elongated acoustical conduit.

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47. The method of claim 46, wherein said adding includes connecting inlets to said front volume and said back volume at a location external to a housing of said directional microphone.

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48. The method of claim 46, wherein said adding includes connecting said front volume and said back volume at a location internal to a housing of said directional microphone.

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49. A listening device, comprising:

a directional microphone including a wind-noise suppression conduit and a diaphragm producing input audio signals responsive to sound energy, said diaphragm dividing a front volume from a back volume within said microphone, said wind-noise suppression conduit acoustically connecting said front volume and said back volume;

an amplifier for amplifying said audio signals into amplified audio signals; and

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a receiver for converting said amplified audio signals into acoustical signals broadcast to a user of said hearing aid.

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50. The listening device of claim 49, wherein said wind noise suppression conduit is located external to a housing of said directional microphone.

51. The listening device of claim 49, wherein said wind noise suppression conduit is located within a housing of said directional microphone.

52. The listening device of claim 49, wherein said noise suppression conduit is formed between a housing of said directional microphone and a mounting plate positioned against said housing.

5 53. The listening device of claim 49, wherein said listening device is a hearing aid.

54. A listening device comprising:

10 a directional microphone including a first inlet and a second inlet for receiving sound energy and a diaphragm producing input audio signals responsive to said sound energy, said diaphragm dividing a front volume from a back volume within a housing of said microphone; and

a mounting plate positioned against said microphone; and

15 a wind-noise suppression conduit forming an acoustical pathway between said front volume and said back volume of said microphone, said wind-noise suppression conduit being at least partially defined by said mounting plate.

55. The listening device of claim 54, wherein said wind-noise suppression conduit is defined entirely by said mounting plate.

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56. The listening device of claim 55, wherein said wind-noise suppression conduit is a hollow tube internal to said mounting plate.

57. The listening device of claim 54, wherein said wind-noise suppression conduit
25 is defined by said mounting plate and an outer surface of said housing.